CLINICAL NEUROLOGY.

40. L'EXAGÉRATION DES RÉFLEXES ET LA CONTRACTURE CHEZ L'HEMIPLÉGIQUE. (The Exaggeration of the Reflexes and the Contracture in the Spastic and the Hemiplegic). A. Van Gehuchten (Journal de Neurologie et d'Hypnologie, 2, 1897, p. 621).

A lesion of the pyramidal tract in its cerebral portion causes flaccid paralysis and loss of voluntary movements, whereas a lesion in its spinal portion causes spasticity without paralysis, but with impairment of voluntary movements. According to Van Gehuchten, the motor cortex is connected by two tracts with the cells of the peripheral motor fibres; by a direct corticospinal tract, and by a corticopontocerebellospinal tract. These two tracts are united from the cerebellar cortex to the lower part of the pons, and in the latter region they separate, one passing to the cord as the pyramidal tract, and the other to the cerebellar cortex, from which point other fibres descended into the anterior part of the lateral column of the cord. The flaccid paralysis and the loss of voluntary motion in the hemiplegic are the results of destruction of both tracts. The spasticity and partial preservation of voluntary motion in the spastic are the result of interruption of the corticospinal tract, with preservation of the corticopontocerebellospinal tract. The interruption of the corticospinal tract within the cord suspends the inhibitory action of the cortical cerebral cells upon the motor spinal cells, and is the immediate cause of the exaggeration of the reflexes, whereas the motor tract, passing through the cerebellum, preserves the connection with the cerebral cortex and prevents paralysis. It has been thought that interruption of the pyramidal tract causes paralysis, and that the degeneration of these fibres causes spasticity or contracture. Van Gehuchten disputes these statements, and attempts to show that the theories advanced in regard to the effects of secondary degenerations cannot satisfactorily explain the contractures.

Babinsky has recently stated that there is impairment of the muscular tonus in hemiplegia, *i. e.*, that the passive movements of extension and flexion are greater in the paralyzed limbs. This hypotonicity has been noticed not only in recent cases, in which there had been no exaggeration of the tendon reflexes, but also in cases of hemiplegia which had lasted several months, and in which there had been exaggeration of the tendon reflexes.

The muscular tonus is the outward expression of the condition of the stimulation of the spinal cells, and this condition is the result of stimulation and inhibition by means of the posterior spinal roots, and the pyramidal and descending cerebellar fibres. The muscular tonus is exaggerated in the spastic because of the stimulation through the cerebellospinal and posterior root fibres, and the loss of inhibition through the pyramidal fibres. Complete transverse lesions of the cord destroy the cerebellospinal and the corticospinal fibres and cause hypotonia. The hypertonia produced by destruction of these two tracts in cerebellar hemiplegia proves that the hypotonia in complex lesions of the cord is not due merely to destruction of fibres from the cerebellum, together with the pyramidal fibres, but to destruction of the corticopontocerebellospinal tract, together with the pyramidal. The exaggeration of the reflexes in both the hemiplegic and the spastic, and the impairments of the muscular tonus in the former and the exaggeration in the latter, prove that the condition of the reflexes is independent of the muscular tonus. This Van Gehuchten believes, because:

1. In the hemiplegic there is impairment of the muscular tonus and exaggeration of the reflexes.

2. In the spastic there is exaggeration of the muscular tonus and exaggeration of the reflexes.

3. In the cerebellar lesions there is exaggeration of the reflexes and normal muscular tonus.

4. In complete transverse lesion of the cervicothoracic cord there is diminution of the muscular tonus and abolition of the reflexes.

The cerebellum seems to have an important influence on the condition of the reflexes, if not on the tonus, for lesions which destroy both motor tracts in the cerebrum cause an exaggeration in the reflexes, whereas lesions which destroy both tracts in the cord cause an abolition of the reflexes.

The contracture of the hemiplegic is not comparable with the contracture of the spastic. In the former there is a lesion of both motor tracts, in the latter only of the corticospinal fibres. The contracture of the hemiplegic is late in its manifestation; it is always preceded and accompanied by paralysis; it presents a variable location in the muscles of a limb; the muscular tonus is impaired, and the contracture is persistent in repose as well as in activity. The extensors of the upper limb are usually more paralyzed than the flexors, and all voluntary efforts to move the paralyzed member affect the flexors. The posthemiplegic contracture is the result of muscular contraction, not of retraction. The variations of type of the contracture depend on the fibres destroyed in the internal capsule.

The contracture of the spastic begins as soon as there is destruction of the spinal portion of the pyramidal tract; it is not associated with complete paralysis. It involves all the muscles of the affected limbs; the mucular tonus is exaggerated and the degree of the contracture is increased by motion. The contracture of the spastic is the clinical expression of the exaggeration of the muscular tonus.

Van Gehuchten makes the following brief statements:

1. The secondary degeneration of the pyramidal fibres and the consecutive sclerosis are not manifested by any outward signs.

2. The exaggeration of the reflexes and the contracture in the hemiplegic and in the spastic are independent of the pathological conditions.

3. The condition of the reflexes is entirely independent of the condition of the muscular tonus.

4. The normal condition of muscular tonus depends, at least in great part, on the connection of the spinal with the cortical cerebral cells. Complete separation of these causes diminished tonicity.

5. The normal condition of the reflexes also depends on this connection of the spinal with the cortical cerebral cells, and complete separation of these causes exaggeration of reflexes. The condition of the reflexes in complete, transverse spinal lesions (Bastian) cannot be satisfactorily explained.

6. The contracture of the hemiplegic is very different from the contracture of the spastic.

7. The contracture of the spastic is of central origin and is due to exaggeration of the muscular tonus. This exaggeration is due to interruption of the corticospinal tract with preservation of the corticopontocerebellospinal tract.

8. The posthemiplegic contracture is of peripheral origin, and is due to a minor degree of paralysis in the flexor muscles of the upper limb and to the contraction of these.

There are fibres in the anterolateral columns which degenerate downward after lesions of the cerebellum.

SPILLER.